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ABSTRACT

The theory and practice of the instructional design system includes the categories of design, development, utilization, evaluation, and management; instructional designers and teachers need to determine an appropriate balance of structural knowledge and detailed knowledge acquisition. The purpose of this study was to determine what teachers' current perceptions were of instructional design and if the course had any affect on their understanding. Participants were 60 graduate students enrolled in a required course on instructional design of software at the National-Louis University. The following criteria were used in the final evaluation to show their understanding of the instructional design process: title screens, menu, instruction screens, and good balance of graphics, text, sound, animation, appropriate metaphor, and consistent navigation tools throughout. A 6-question questionnaire was administered, as a pretest and then as posttest, to the participants to determine their understanding of the instructional design and how it was used in their teaching. Included in the questionnaire were questions concerning the course, its purpose, and the benefits to their teaching. Design principles were not very eloquently described in most posttest questions, but there was an awareness that was not apparent in the pretests. Software's relationship to instructional design was very apparent. The teacher responses make apparent that teachers lack the extensive time it takes to process an instructional design. The questionnaire is appended. (Contains 16 references.) (AEF)

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Teachers' Perceptions Of Instructional Design

Ann S. Dana

Abstract

Over a two year period, in five sections of a ten week course in instructional design of software, sixty graduate students took part in the study. Students were surveyed using a six part questionnaire at the beginning and end of the course. The goal was to determine students' understanding of instructional design. The results indicated there was no awareness of design principles on the pretest. Twenty per cent indicated they did not understand the term compared to sixty-eight per cent positive responses on the post test. CAI software modules, designed by the students, showed better understanding of visual design principles than responses indicated.

Introduction

The development of the field of instructional design has covered many decades along with the field of educational psychology. As more is learned about how we learn, the closer we get to providing the best techniques for creating the instruction that will help each and everyone learn to the best of their abilities. Learning theories have changed considerably in recent years as we begin to understand more about how students learn. Shuell (1990) stated these insights into how learning takes place indicate that the behavior theory of learning is not applicable for student learning today. The author foresees new theories and procedures emanating if instructional design is to remain relevant to the learning that is taking place today. Jonassen (1995) stated that schools and universities must recognize the need to support students in active, constructive, collaborative, intentional, conversational, contextualized, and reflective learning.

The theory and practice of the instructional design system includes the categories of design, development, utilization, evaluation, and management (Seels, 1995). There is a need to integrate the instructional design process with outcomes based education. In helping teachers understand the fundamentals of instructional design this study used the definition by Shambaugh (1994) who stated that instructional design is: "A process which analyzes the needs of learners and designs structured 'possibilities' to address those needs." (p. 4) Instructional designers and/or instructors should determine an appropriate balance of structural knowledge and detailed knowledge acquisition. Detailed objectives prior to beginning a lesson and a reminder to pay close attention to relationships would help in understanding this knowledge (Beasley & Waugh, 1996).

User or Audience

Instruction begins with the analysis of the prospective user or audience. The importance of the learner or user has also been noted as an important element of the design of instruction by both Apple (1992) and Microsoft (1995) development teams. Identifying and understanding your audience are the most important first steps in designing your product (Apple, 1992). Designers must let go of their own feelings, desires and experiences and strive to see through the eyes of the user (Howlett, 1996). This may mean studying the people in the target group, thinking about where they work, tools they use, limitations they deal with. "A well designed user interface is built on principles and a development process that centers on users and their tasks." (Microsoft, 1995, p. 3). It is one of Gagné's elements of instruction (Gagné, 1987). Considering the user is necessary in the design and development of any type of instruction. It is essential to the design of software that the interface makes the information in the program readily available to the user (Jones, Farquhar, & Surry, 1995). Teachers are involved closely with learners daily. Taking a closer look at the learners' characteristics is a major element of instructional design. The project to be developed by the teachers, as students and consequently as designers, was to be an interactive learning environment. The

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teachers had to understand that the learners would be making decisions, choosing directions, puzzling over options, and accepting the consequences. Schweir (1991) cautions that if the interactive environment is to be useful, the motivation, that builds the learner's desire to learn from the content, must be a key concern. Many considerations need to be addressed, such as prior knowledge of the learners, integration of new knowledge with existing knowledge, organization of concepts to be learned, differences in learner familiarity with content, how knowledge improves, how learning improves, how to improve transfer, benefit of feedback, how to prevent confusion, and how to adapt to individual learners. It is essential that a designer needs to have a firm understanding of instructional design before developing software.

A model should show the strong correlation between the teacher and/or designer and the three major components:

- The Who, the learners and their characteristic;
- The What, the content and objectives of the subject matter within the curriculum;
- The Where, the learning environment including what we know of learning theory along with the needed elements of instruction and design principles.

There is a need to gain a greater understanding of how we can bring the worlds of instruction and instructional design closer together.

Teachers' Role

What meaning do classroom teachers, as graduate students, bring to the term instructional design? What significance does it have for them? Do teachers feel differently about the importance of instructional design after taking the course? The purpose of this study was to determine what teachers' current perceptions were of instructional design and if this required course had any affect on their understanding. Because the teachers used hypermedia authoring software to demonstrate their knowledge of instructional design, did they also show a greater understanding of the design elements needed for effective instruction?

Teachers have many strengths including planning a course of study, evaluating and locating instructional materials, developing more materials if needed, handling administrative detail, plus evaluating student progress and keeping records, and keeping parents and administrators informed of the students' progress. Above all it is their job to teach. Teachers' perceptions of what they know about new ideas, equipment and materials is hampered by lack of time and experienced help, but also experiencing frustration easily (Hannafin & Peck, 1988). Teachers' beliefs in how students learn is the key to the approach in using technology in the learning environment. Giving guidance to teachers in workshops or course work should revolve around what the teacher already uses as methods and strategies in the classroom. The instructor can then model or guide the teacher into how technology would support what this teacher already believes (Dana, 1993).

Design of the Study

Five groups participated in the study. Sixty graduate students, taking a required course titled Instructional Design of Software, while pursuing either a Masters or a Certificate of Advanced Study in Technology in Education at the National College of Education at National-Louis University, participated in the study. The majority had no prior experience with hypermedia authoring software. While those who had prior experience might be considered to have an advantage, they were all on equal ground in the development process.

Procedure

The setting was a ten week course on instructional design of software. Each class session was three hours once a week and students would need to spend three to nine hours of preparation time prior to each class. Longer preparation time was needed during the development cycle. Part of each class was spent in discussion of the readings for the week. These documents gave background information in instructional

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design theory and in practical uses of hypermedia. Instructional design theory was the essential basis for this course. The course included two basic sections, instructional elements (gain attention, state objective, stimulate recall of prerequisite learning, present stimulus material, provide learning guidance, elicit the performance, provide feedback, assess performance, enhance retention and transfer) (Gagné, 1987) and design principles (define users, state purpose, presentation methods are logical, easy navigation, clear introduction, layout consistent; and text, graphics, and audio appropriate and integrated; and no glitches) (Apple, 1989).

Students also analyzed commercial CAI software using an instrument that dealt with their awareness of these instructional and design elements inherent in the software. There were practice sessions with the hypermedia authoring software as they were planning and critiquing each others' designs for a CAI software module that incorporated as many of the instructional and design elements as were needed. The final class session was dedicated to the participants presenting their CAI projects with documentation. Peer editing and evaluation were continuous throughout the developmental process as well as in the final analysis. The following criteria were used in the final evaluation to show their understanding of the instructional design process:

Title Screens - title, byline, instructions, instructional goal, objectives, navigation aids, introduction to the user.

Menu - clear, concise, instructions, navigation aids, one selection on menu completed.

Instruction Screens - consistent design framework, precise functional areas, good use of all design principles, positive feedback.

Good balance of graphics, text, sound, animation, appropriate metaphor, and consistent navigation tools throughout.

Instrument

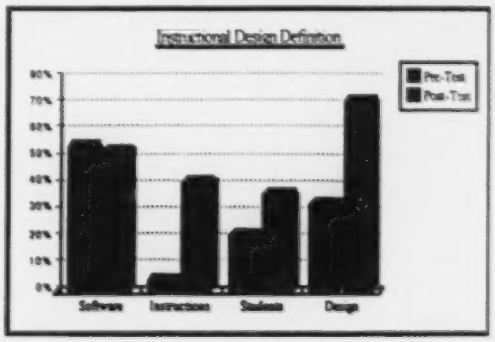
A six question pre/post questionnaire was developed and administered to the participants (see Appendix). The purpose was to determine the participants' understanding of instructional design and how it was used in their teaching. Also included were questions concerning the course, its purpose, and the benefits to their teaching. The first question concerned what the participants felt were important criteria in software that they would or could use with their students. Questions 2 and 3 will be discussed in this paper, along with the examples of how instructional design was demonstrated in their projects.

Data Analysis

The responses to the questionnaire have been analyzed using the Data Collector, a HyperCard program that allows narratives to be entered and analyzed for key words or phrases (Turner & Handler, 1992). Topic cards were created for each of the key words. The topic cards were further analyzed with other key words assigned. Comparison of the pre and post responses were done for questions 2 and 3. Three topics were chosen to be compared and graphically presented for these two questions on the pre and post tests.

Figure 1 shows the participants' responses to question 2. Even after the 10 week course, the design, creation, or evaluation of software was not dissimilar. However, in reading the narratives on the survey, greater differences were apparent for the same respondent.

Figure 1
Instructional Design Definition
Pre/Post Test Comparison



The definition as described on one pretest stated, "How the software is designed to be

used in an instructional setting." The post test for the same participant stated, "The design of lesson materials has design elements incorporated which facilitate learning."

A second example for the pretest ID definition revealed, "A design that will enhance learning and foster student productivity. I have tons of drill and practice software, but I feel my students need to get more involved with multimedia and start generating questions and finding answers for those questions. I don't want software to do my job, but I want it to help me do a better job." The post test definition for this participant was, "A piece of software that has been designed to enhance instruction or the learning of concepts. However, the design should be motivational and easy to navigate in; the context should be clear & consistent; it must state its purpose and how to use it; text, graphics & sound should be integrated. But most important, it must simulate the real world & encourage the students to interact with it."

Comparison of the responses for design and design principles related much greater concern for the use of design principles on the post test. Both of the post responses above show the recognition for their use. All of the responses on the pretest mentioned design only in relation to 'designing software' and not what elements were needed to make it effective, as is seen in the pretest response for the second participant. Instruction was more important to the participants after the course than prior. The difference in the importance of students to instructional design was greater on the post test. One participant did not respond to the question on the pretest.

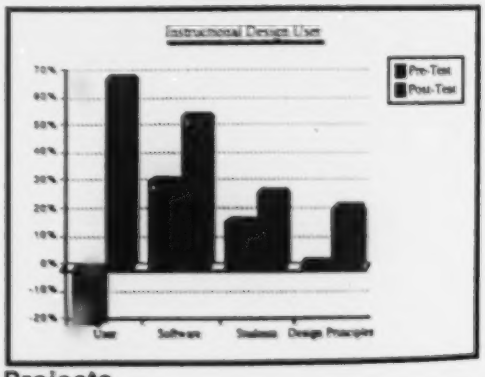
The third question asked the participants to answer and explain if they were users of instructional design. The terminology drew a blank on the pretest for twenty per cent of the respondents while sixty-eight per cent indicated on the post test they were certain they were users. The first example of the responses shows what a powerful amount of understanding was achieved over the duration of the course while a second respondent realized instructional design has a place within the planning of all instruction.

A participant answered, "I'm not really sure" on the pretest, but elaborated on the post test with, "Yes, because we learned the different elements of design in class and incorporated these into the program designed for class. Now, when I see a new software program I ask the questions from number 1," which stated "1) Is the software appropriate for the age of my students? 2) Is the title screen clear and self explaining? 3) Is the user in control? 4) Is "help" easily available? 5) Is there clear documentation? 6) Do students get appropriate feedback? 7) Is there consistency from screen to screen?"

A second example of response to the pretest was, "Yes. I 'design' my lessons to accomplish my goals and meet my objectives, to be interesting, and to be 'user friendly'."

On the post test this same participant wrote, "Yes, now, however, I am more conscious of design as it applies to everything! I find myself analyzing my lessons, TV commercials, - you name it. I'm always thinking about how it could have been better."

Figure 2
Instructional Design Users
Comparison Of Pre/Post Test
Responses



Projects

Most of the projects the teachers presented showed a solid understanding of the design principles. It is important to look at this aspect of the study. Do the actual projects show more of what the

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participants learned about instructional design than the narratives reveal? Since the teachers used hypermedia authoring software to demonstrate their knowledge of instructional design, did this medium provide the vehicle needed to show their understanding of the design elements needed for effective instruction?

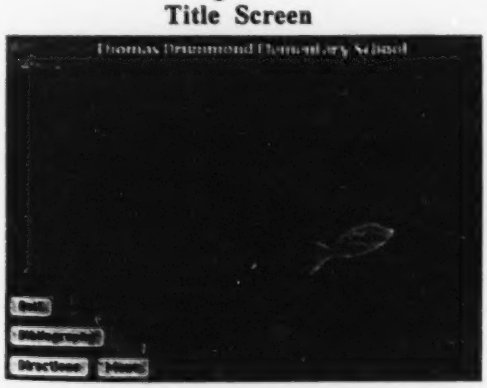
Background information on CAI (computer assisted instruction) was given to all students. Analysis of commercial software, where aspects of design elements were discussed, preceded students planning and executing their designs. The planning included analysis of the users, selection of content, listing objectives to be incorporated, and planning screen designs which were peer edited before execution on the actual screen.

CAI software should be interactive, friendly, motivating to the user which may include using a guiding metaphor to make the software more intuitive for the user.

Title Screen

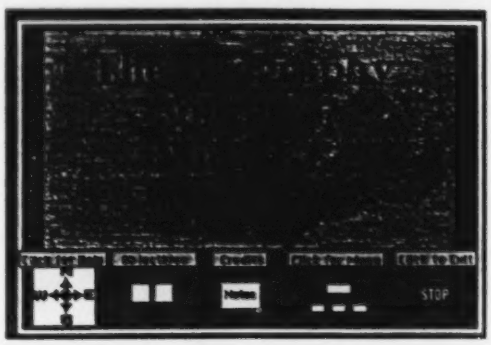
Title Screens were to include the title, byline, instructions, instructional goal, objectives, navigation aids, introduction to the user. The following figures are examples of how students incorporated the requirements:

Figure 3
Title Screen



This example of a title screen included appropriate graphic to the title. The font was legible. The metaphor was the pond within the school, the brick wall representing the school. Included were buttons to access credits, bibliography, directions, and the menu. The purpose was included under the title. Information on what the user was to do was included. It is not enough to include just icons, words are needed for clearer understanding (Howlett, 1996), as in the following example of a title screen. The metaphor of using a map for motivation relates well to the topic and to the age of the users.

Figure 4
Title Screen 2



Menu Screen

Menus were to be part of the projects. Students were required to make certain that the users had a choice of the path to follow and were to include clear, concise, instructions, and navigation aids. The graduate students were to follow one selection on menu to completion.

Figure 5
Menu Screen

This example of a menu screen for an early learning project included all directions using the audio capabilities of the authoring software which were read when the mouse passed over the large button area. Primary

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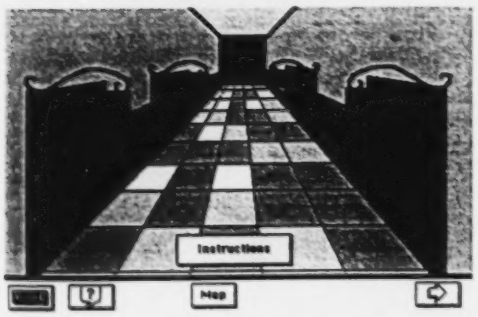
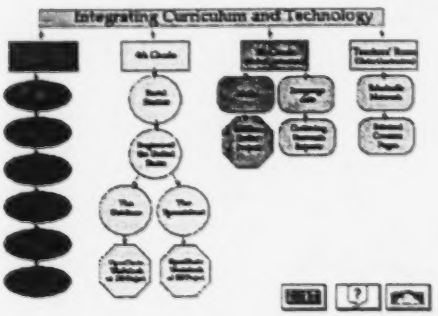
colors of red and blue with a yellow background were appropriate for the user's age group and the content. The title of the program was included. The stop sign was a familiar icon for any age group, but the word stop was aiso included.

Figure 6
Menu Screen 2



This menu incorporated a school hallway as the continuing metaphor used in the project. This project was developed for teacher use. The button map took the user to a concept map that showed the relationship of all screens. This is a navigational aid that gives the user control over their location in the program.

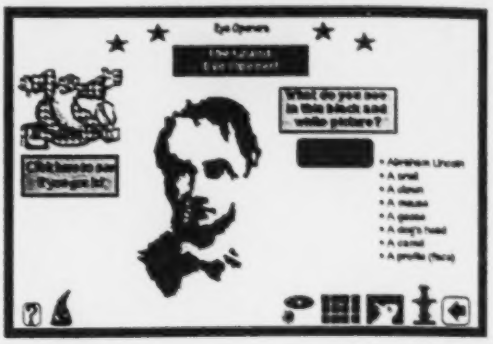
Figure 7
Concept Map



To navigate effectively throughout a stack, the users must know their options. Five user needs should be addressed:

- context, what is it about;
- location, where is user now;
- destination choices, where can user go;
- travel methods, how will user get there;
- progress indicators, where have users been (Apple, 1989). The following example displays icons appearing to the left of the arrows that represent previously visited locations. Users can return to any of those locations by clicking the icon.

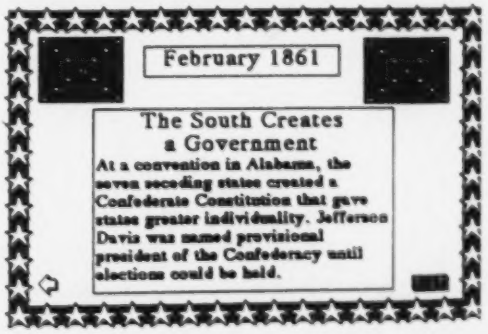
Figure 8
Location Icons



Instruction Screens

The student designers were to select one item from their proposed menu and complete a module that would include instruction and a way for the user to check themselves on the information. The instruction screens were to include consistent design framework, precise functional areas, good use of all design principles, and positive feedback for right or incorrect responses. The content area the students chose had a great influence on the way the information was projected.

Figure 9
Information Screen


February 1861
The South Creates a Government
At a convention in Alabama, the seven seceding states created a Confederate Constitution that gave states greater individuality. Jefferson Davis was named provisional president of the Confederacy until elections could be held.

The information presented to the user includes text in red. Previous instructions to the user informed them that more information would be given if the red text

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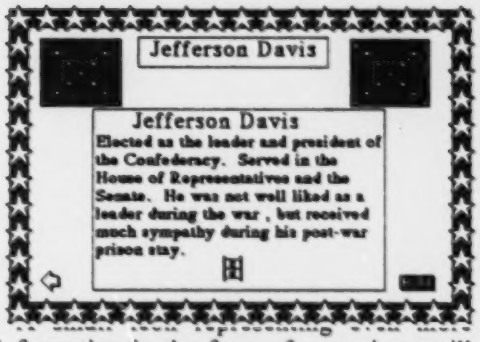
were clicked.

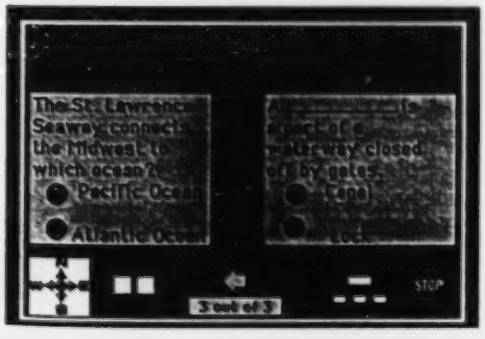
Figure 10
Response to Hot Text


Jefferson Davis
Jefferson Davis
Elected as the leader and president of the Confederacy. Served in the House of Representatives and the Senate. He was not well liked as a leader during the war , but received much sympathy during his post-war prison stay.

information in the form of a movie or still picture is accessed by a click.

After information is given students can take a quiz to determine if they have gained the information. To be usable to the teacher, a management system would be included. Where a teacher merely wants students to check themselves, simple non-graded evaluations can take place. The user should receive positive, helpful feedback whether to a right or a wrong answer. The following is an example of a question and answer covering what they were informed about the Midwest.

Figure 11
Quiz

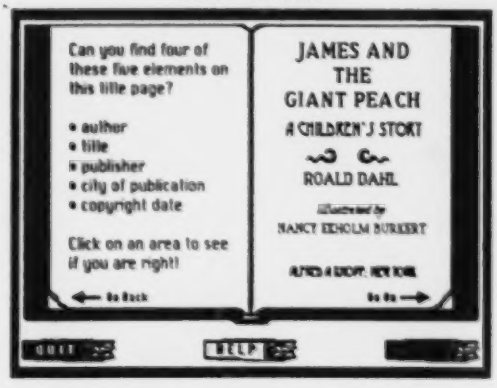


Appropriate feedback should be non-threatening, immediate and informative. It should be free from elaborate praise of correct answers and free from rewards for incorrect answers. It should also be relevant for the particular users.

Figure 12
Positive Feedback to Incorrect Response

A self check can also be made by the designer giving an example and asking the user to see if they can find examples. They can go back and reread the instructions if they cannot recognize the elements or parts.

Figure 13
Self Check



Discussion

Design principles were not very eloquently described in most post test questions, but there was awareness that was not apparent in the pretests. Software's relationship to instructional design was very apparent. Students were also important in the design process. One participant wrote on the post test for the question as to how the course would impact her teaching, "I now am very confident in what I am looking for in software design, etc. this can only impact my teaching and my instruction in a positive way. I can design

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my own program to address the needs of my students. I do not have to search for a program that may meet some of the needs. I can design my own program to reinforce anything that I may teach in class. This will really impact my instruction and the learning that will take place in my classroom. I have enjoyed this class immensely and feel it was well taught. I see myself using this in my classroom and have ordered HyperStudio for my class for the next school year. My students will be so excited to have the opportunity to present using different criteria. This can only make my life as a teacher more enjoyable. Having motivated, excited students in your classroom will have a direct impact upon my teaching. I will begin to have fun again along with my students. What I have learned in class affords me the creative opportunities that I so enjoy."

It is little wonder that teachers do not recognize that there is a correlation between developing instruction and instructional design. Earle and Sheffield (1995) stated that there are discrepancies between the roles and needs of teachers and the requirements of the instructional design process. In essence teachers plan mentally; designers create detailed plans on paper. Teachers use already prepared materials; instructional designers don't accept them. Teachers focus on instructional activities; instructional designers focus on the process and the product. It takes a great deal of time to process a design; teachers lack the time. The sampling of the teacher responses makes this apparent.

Responses to all questions found software to be the dominant response within the narratives on the teacher survey. As these teachers are enrolled in a degree program in technology, they would possibly assume software would be involved. Further research may shed light on why they do not all recognize instructional design as part of their daily planning. The survey could include questions concerned with the recollections of their educational background, when and where they learned to prepare instructions. Survey question 6 narratives revealed the direction they hoped to go or would go after the course experience. 40% of the participants found it would directly affect their teaching. One such response, "I think my teaching strategies will change somewhat even if I'm not working on computers. We studied characteristics of the user; well in a classroom they are the learner, visual, tactile, etc. and as a teacher, you must remember all your students are different and on slightly different levels." Another further justified the impact, "...as I prepare class lessons and activities I keep in mind effective instructional design."

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Appendix

Questionnaire

1. If you were responsible for selecting software for your classroom, list the criteria you use.
2. When you hear the term instructional design, what does it mean to you?
3. Do you perceive yourself as a user of instructional design? Explain your answer.
4. What do you see as the relationship between your answer to question 2 and the design of the software used in your classroom?
5. Describe what you think you will be discussing and learning in this class. (pretest)
5. What relevance does what we discussed and learned in this class have on how you develop instruction. (post test)
6. Based on your previous answer, do you expect this course to have an impact on your teaching? Please, explain your answer.